# Yann Le Gorrec, [redacted]

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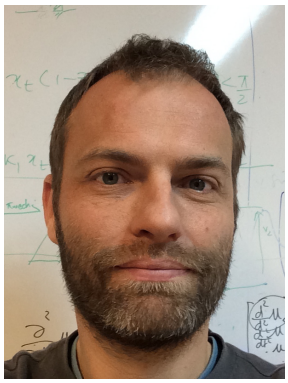
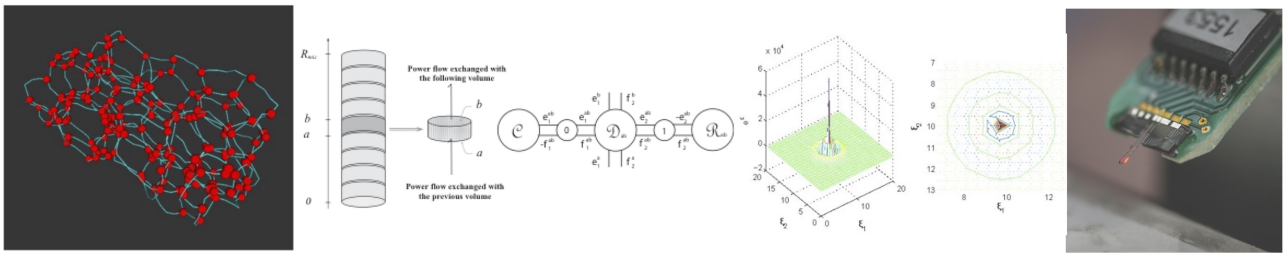


***Short bio:*** *Y. Le Gorrec is full Professor at SUPMICROTECH ENSMM Besançon, France. He is the director of the AS2M department of the FEMTO-ST institute. His current field of research is the control of distributed parameter and nonlinear systems with an application to smart material based actuators, micro and fluidic systems by using the port Hamiltonian framework and their extensions to irreversible Thermodynamics. He has co-authored more than 250 publications (among which 70 journal papers, 10 book chapters) and has been invited to give more than 30 plenary talks on these topics. He has been the coordinator of numerous major collaborative research projects. He has been an AE for IEEE Transactions on Automatic Control during 6 years and is currently AE for Systems and Control Letters, Mathematical Control and Related Fields and Automatica. He has been the chair of the IEEE CSS Technical Committee on Distributed Parameter Systems from 2016 to 2019 and is currently the chair of the IFAC TC 2.6 on Distributed Parameter Systems and member of IFAC TC2.1 Control Design, TC2.3 Control of Nonlinear Systems.*




## Current positions

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| Since 2008 | **Full Professor in Automatic Control (Classe exceptionnelle since 2016 (CE2))**CNU 61 at FEMTO-ST Institute, SUPMICROTECH ENSMM, Besançon, France. |
| Since 2022 | **Director of the AS2M Research Department** (80 people) of the FEMTO-ST institute, Besançon France. |

## Education

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|---|---|
| 2005 | **Habilitation à diriger des recherches (HDR)** in Automatic Control from University Claude Bernard of Lyon, Lyon 1, France with the habilitation thesis titled *Méthodologies pour la commande robuste et l'étude des systèmes de dimension infinie : application au génie des procédés.*(French). Habilitation committee: H. Abou Kandil (FR), J. Grizzle (USA), B. Maschke (FR), A.v.d. Schaft (NL), D.Thomasset (FR), G. Weiss (GB). |
| 1998 | **Doctoral degree** in Automatic Control from National Higher School of Aeronautics and Space (Supaéro), Toulouse. Doctoral graduation with honors with the thesis titled *Modal robust control and self scheduling control design : a multimodel approach.* |
| 1995 | **Engineering degree**, Electrical engineering department, INSA Toulouse, France. |
| 1995 | **Master's degree** in Automatic control, INSA Toulouse, France. |

## Previous positions

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| 2014 – 2022 | Deputy Director in charge of the scientific council of the AS2M Research Department of the FEMTO-ST institute, Besançon France. |
| 2009 – 2022 | Head of the Teaching Department on Automatic-Control/Mechatronics (12 people) of the National Engineering Institute in Mechanics and Microtechnologies of Besançon, France. |
| 2009–2014 | Head of the research group COntrol and Design (12 people), AS2M Department of the FEMTO-ST institute, Besançon France. |
| 1999–2008 | Assistant and then (2005) Associate Professor at the Laboratory of Automatic and Process Control (LAGEP), University of Lyon, Lyon 1, France. |
| 2004 | Half time position as scientific expert within Total Atofina Company, Lyon, France. |
| 1998–1999 | Post doctoral position at ONERA Toulouse, France. |
| 1995–1998 | Doctoral student at Supaéro, ONERA Toulouse, France. |
| 1997–1998 | Military service as lecturer at ENSICA, Toulouse, France. |

## Research Interests

**Keywords:** Port Hamiltonian systems; modelling and control of non linear and distributed parameter systems; irreversible Thermodynamics; model reduction; mechatronics. **Author of more than 250 publications (among which more than 70 journal papers and 30 invited plenary talks)** on modelling and control of linear and non linear systems, infinite dimensional systems, and uncertain systems with application in aeronautics, acoustics, process control and mechatronics.

## Regular collaborators

H. Ramirez (Santa Maria Univ., Chile), B. Maschke (LAGEP, Lyon, France), L. Lefevre (LCIS, Valence, France), H. Zwart (Twente Univ., The Netherlands), D. Matignon (ISAE, France), J. Yuz (Santa Maria Univ., Chile), A. Macchelli (Bologna Univ., Italy), W.Hu (Univ. of Georgia USA), L. Paunonen (Tempere Univ. Finland), J. Winkin (Univ. Namur, Belgium).

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| 2012 - 2018 | **Host** for the visiting professors H. Zwart (2012-2015), A. Macchelli (2014), J. Yuz (2017), W. Hu (2018), L. Paunonen (2016) |
| 2014 & 2017 | **Invited professor** at LIMMS Tokyo, Japan two weeks (2008), Universidad Técnica Federico Santa Maria, Valparaiso, Chili. 10 days (2014) and 1 month (2017). |

## Involvement in research/education projects as project/node leader (PL/NL)

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|---|---|
| 2023- 2024 | **Erasmus Mundus Design Measure MODSICOPSYS 101128154 (PL)**. Modelling, simulation and control of multiphysics systems. Lyon University, Grenoble Alp, Supaéro, Technical University of Munich (TUM),University of Bologna, University of Groningen, University oft Twente |
| 2023- 2027 | **H2021-MSCA-ITN-2021 ModConflex (MSCA-ITN-ETN 101073558) (NL)**. Modelling and control of flexible structures interacting with fluids. Tel Aviv University (Israel), The University of Warwick, Imperial College of Science, Technology and Medicine, The University of Exeter (United Kingdom), Universiteit Twente |
| 2021- 2025 | **ANR PRC IMPACTS (PL)**: Collaborative project on Implicit port Hamiltonian control systems. Partners : FEMTO-ST, LAGEPP, ISAE Supaéro, LCIS. **Budget 438 K euros.** |
| 2017- 2022 | **H2020-MSCA-ITN-2017 ConFlex (MSCA-ITN-ETN 765579) (NL)**. Control of flexible structures and fluid-structure interactions. Tel Aviv University (Israel), The University of Warwick, Imperial College of Science, Technology and Medicine, The University of Exeter (United Kingdom), Universiteit Twente |
| 2017- 2021 | **ANR PRCI - ANR/DFG INFIDEM (NL)**: Collaborative innternational project on modeling and control of heterogeneous systems organized in networks. Partners : FEMTO-ST, le LAGEP, l'ISAE, TUM Munich, UW. Wuppertal, UCA Kiel. **Budget 640 K euros.** |
| 2011- 2016 | **ANR - HAMECMOPSYS (PL)**: Hamiltonian Methods for the Control of Multidomain Distributed Parameter Systems. Partners: FEMTO-ST, le LAGEP, l'ISAE et l'IECN. **Budget 549 K euros.** |
| 2006- 2010 | **ANR JCJC- RECIPROC (Young research project, PL)**: Robust and Efficient Control of Infinitite dimensional systems : application to PROCess control. **Budget 118 K euros.** |
| 2013-2016 | **ECOS-CONICYT C12E08, PL**: Modelling and stabilization of distributed port Hamiltonian. Joint project with the Universidad Técnica Federico Santa María, Valparaiso, Chile. systems: |
| 2008-2010 | **SAKURA PL**: Modeling and control of Nanotweezers for DNA bundle characterization. Joint project with the Tokyo University IIS, Tokyo, Japan. |
| Since 2014 | **Industrial grants, PL**: Total Atofina, IFP, Arkema, Alstom. |

## Memberships of scientific societies

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|---|---|
| Since 2020 | **Chair of the IFAC TC 2.6 Distributed Parameter Systems.** |
| 2016-2019 | **Chair of the IEEE CSS TC on Distributed Parameter Systems.** |
| 2009 -2018 | **Co-chair of the IFAC Technical Committee 2.6 Distributed Parameter Systems.** |
| 2006-2013 | Chair of the National Working Group on Control of DPS, GDR MACS, France. |
| Since 2009 | **Member of the IFAC TC 2.1 , 2.3 and 2.6. and of the IEEE CSS TC on Distributed Parameter Systems and on Process Control**. |

## Editorial activities

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|---|---|
| since 2022 | **Member of the CSS Technology Conferences Editorial Board.** |
| since 2022 | **Associate Editor - AIMS Mathematical Control and Related Fields.** |
| since 2023 | **Associate Editor - Automatica.** |
| since 2018 | **Associate Editor - Systems and Control Letters.** |
| 2016 - 2023 | **Associate Editor - IEEE Transaction on Automatic Control.** |
| 2020 | **Guest Editor** special number on DPS, IMA Journal of Mathematical Control and Information. |
| 2017 | **Guest Editor** special number on DPS, Mathematical Control and Related Fields. |
| 2022 | **IPC Co-Chair** 4th IFAC Workshop on Control of systems governed by Partial Differential Equations. Kiel, Germany, 7-9 September. |
| 2022 | **IPC Co-Chair Third IFAC summer school on Control of Distributed Parameters Systems** Kiel, Germany, 4-6 September. |
| 2021 | **IPC Co-Chair** 7th IFAC Workshop on Lagrangian and Hamiltonian Methods for Non Linear Control. Berlin, Germany. |
| 2018 | **IPC Co-Chair** 6th IFAC Workshop on Lagrangian and Hamiltonian Methods for Non Linear Control. Valparaiso, Chile. |
| 2017 | **Member of the CDC Best Student PaperAward committee**, $56^{th}$ *Conference on Decision and Control*, Melbourne, Australia. |
| 2016 | **IPC Co-Chair First summer school on Control of Distributed Parameters Systems** Bertinoro, Italy, June 13-15, 2016. |
| 2015 | **Editor** of the 5th IFAC Workshop on Lagrangian and Hamiltonian Methods for Non Linear Control, Lyon, France. |
| 2013 | **Editor** of the 1st IFAC Workshop on Thermodynamic Foundations of Mathematical Systems Theory, Lyon, France. |
| 2013 | **Editor** of the 1st IFAC Workshop on Control of Systems Governed by Partial Differential Equations, Paris, France. |
| since 2005 | **Member of the International Program Committees** of IFAC World Congress (2013,2017, 2021), NOLCOS 2013, MICNON (2021), MATHMOD (2022), LHMNC (2012, 2015, 2018, 2021), IFAC CPDE (2013, 2016, 2019, 2022), IEEE/ASME AIM (2014, 2017), dMEMS 2012. |

## Conferences organization

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| 2022 | **Co-Organizer** of the CIRM Workshop "Energy Based Modeling, Simulation, and Control of Complex Constrained Multiphysical Systems", France, February, 2022 |
| 2017 | **Co-Organizer** of the CDC Workshop "New trends in Control of Distributed Parameter Systems", Las Vegas USA, december 11, 2016 |
| 2015 | **NOC Co-Chair** of the 5th IFAC Workshop on Lagrangian and Hamiltonian Methods for Non Linear Control, Lyon, France. |
| 2013 | **NOC Co-Chair** of the 1st IFAC Workshop on Thermodynamic Foundations of Mathematical Systems Theory, Lyon, France. |
| 2013 | **NOC Co-Chair** of the 1st IFAC Workshop on Control of Systems Governed by Partial Differential Equations, Paris, France. |
| 2012 | **Organizer** of the International Workshop *New Trends and Challenges in Modeling and Control of Microsystems - From Theoretical Concepts to Implementation*, FEMTO-ST-ENSMM Besancon. |

## Supervision of graduate students and postdoctoral fellows

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| 2022–**Ongoing** | **Co-supervision of 5 PhD students** (3 at UBFC, France and 2 in co-tutelle with UTFSM Valparaiso, Chile). |
| 2016–2020 | **Member of the international PhD committees** of F. Lamoline, University of Namur, Belgium, J. Kadima Kazaku, University of Louvain. |
| 1999–2022 | **Co-supervision of 19 PhD students** (11 at UBFC, France, 8 at University of Lyon, France). |
| 2014–2013 | **Supervision of 3 Post Docs** (12 months each). |
| 2000–2018 | **Supervision of 12 Master students** (6 months each). |

## Teaching activities

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| Since 1998 | **Full time teaching position (240 H/year)** at National Engineering Institute in Mechanics and Microtechnologies of Besançon, France. |
| 2024 | **Organizer and Lecturer** at EECI International Graduate School on Control 2020- Modeling and Control of Distributed Parameter Systems : The port Hamiltonian approach |
| 2022 | **Invited Lecturer** at 2d Spring School on Theory and Applications of Port-Hamiltonian Systems. Island Fraueninsel in the Lake Chiemsee, Gernany, 20-25 March 2022 |
| 2020 | **Organizer and Lecturer** at EECI International Graduate School on Control 2020- Modeling and Control of Nonlinear and Distributed Parameter Systems : The port Hamiltonian approach (`http://events.femto-st.fr/MCDPS-PHS/en`) |
| 2019 | **Invited Lecturer** at IFAC Spring School - Modeling and Control of Distributed Parameter Systems. Oaxaca, Mexico, May 16-18, 2019 |
| 2019 | **Invited Lecturer** at Spring School on Theory and Applications of Port-Hamiltonian Systems. Island Fraueninsel in the Lake Chiemsee, Gernany, 31 March - 5 April 2019 |
| 2018 | **Invited Lecturer** at the Summer School on "Modelling and control at micro, nano and quantum scale" (`http://www.gipsa-lab.grenoble-inp.fr/summerschool/EEAUTO2018/`), Grenoble, France |
| 2018 | **Organizer and Lecturer** at EECI International Graduate School on Control 2018 - Modeling and Control of Distributed Parameter Systems: The port Hamiltonian approach (`http://events.femto-st.fr/MCDPS-PHS/en`) |
| 2018 | **Invited Lecturer** at Pre-LHMNC 2018 Workshop doctoral school "Introduction to modeling and control of port-Hamiltonian systems" 30 April-1 May 2018, Universidad Tecnica Federico Santa Maria, Valparaiso, Chile (`http://www.lhmnlc18.org/pre-workshop-school.html`) |
| 2014-2018 | **Organizer and Lecturer**, Annual international Doctoral course "An introduction to Control of port Hamiltonian Systems" Besancon France (`http://projects.femto-st.fr/CPHS15/`). |
| 2014 | **Invited Lecturer** at Spring School UTFSM 2014 "Modelling and Control of Complex Physical Systems: The Port-Hamiltonian Approach" Valparaiso, Chile (`http://profesores.elo.utfsm.cl/~jyuz/course_oct2014/`). |

## Miscellaneous

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| Since 2009 | **Member of 26 PhD defense committees** (12 as referee and 13 as chair) and **5 Habilitation committees**. |
| 2019 | **Member of the Scientific Committee** *Automatic Control and Signal Processing* of the **French National Research Agency**. |
| 2018 | **Member of the Scientific Committee** *Fundamental and applied Mathematics, Computer Science, Automatic Control and Signal Processing* of the **French National Research Agency**. |
| 2014 & 2017 | **Member of the HCERES (Haut Conseil de l'évaluation de la recherche et de l'enseignement supérieur) committees** in charge of the evaluation of the *Math and Systems department of Ecole des Mines, Mines Paristech* in 2017 and of the *Institut Clément Ader Toulouse* in 2014. |
| 2017 & 2018 | **Referee for the ERC** Advanced Grant Program of the European Commission. |
| 2016 | **Referee for the French National Research Agency**. |

## Awards/Recognition

**2022: Semi Plenary Talk at the 25th International Symposium on Mathematical Theory of Networks and Systems (MTNS 2022)** "Control design for distributed parameter systems: the port Hamiltonian approach", 12-16 September 2022, Bayreuth, Germany.

**2021: IEEE TC DPS Outstanding Student Paper Prize** with Andrea Mattioni, CDC 2021.

**2017: Outstanding service award** of IFAC France.

**2015: Editor's Pick RSI** Influence of mechanical noise inside a scanning electron microscope Marcelo Gaudenzi de Faria, Yassine Haddab, Yann Le Gorrec, Philippe Lutz, Rev. Sci. Instrum. 86, 045105 (2015).

**2012: Keynote paper (semi plenary presentation)** ADCHEM International Symposium on Advanced Control of Chemical Processes, H. Hoang, F. Couenne, Y. Le Gorrec, Chang-Liang Chen, B. Erik Ydstie, Passivity based controller and observer of exothermic chemical reactors.

**2000: Young Author Prize**, 3rd Asian Control Conference, C. Doll, Y. Le Gorrec, J.F. Magni and G. Ferreres, Design of A Robust Self-Scheduled Missile Autopilot By Multi-Model Eigenstructure Assignment, 3rd Asian Control Conference.

**1998: Best publication award - Office National d'Etude et de Recherche en Aéronautique**, Y. Le Gorrec, J.F. Magni, C. Doell, and C. Chiappa, A modal multimodel control design approach applied to aircraft autopilot design, AIAA Journal of Guidance, Control, and Dynamics, Vol: 21(1), pages:77–83, 1998.

## Scientific production

- http://legorrec.free.fr/wordpress/index.php/publications/
- https://orcid.org/0000-0001-6935-1915

### Publications

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|---|---|---|---|
| Journal papers | 70 | Proceedings | 145 |
| Book chapters | 10 | Invited talks | 34 |

## Journals

| | | | |
|---|---|---|---|
| Automatica | 5 | IEEE Transactions on Mechatronics, Mechatronics | 5 |
| IEEE Transactions on Automatic Control | 9 | IEEE Transactions on Automation Science and Engineering | 1 |
| SIAM Journal on Control and Optimization | 1 | Journal of Process Control | 4 |
| ESAIM COCOV | 1 | Control Engineering Practice | 5 |
| System and Control Letters | 1 | IEEE Transactions on Control Systems Technologies | 2 |
| European Journal of Control | 2 | AIAA JGCD, IJNLS, Asian Journal of Control, IJS, Int. Journal of Systems Science , IMA JMCI, EECT, ARC | 16 |
| AICHE, IECR, CES, CCE | 7 | MCMDS, Physics of fluids, Applied Mathematical Modelling, Journal Comp. Physics, ... | 11 |

## Recent selected publications


[1] H. Ramirez, Y. Le Gorrec, and B. Maschke. "Boundary controlled irreversible port-Hamiltonian systems." In: *Chemical Engineering Science* 248, Part A (2022).

[2] L. Paunonen, Y. Le Gorrec, and H. Ramirez. "A Lyapunov Approach to Robust Regulation of Distributed Port Hamiltonian Systems," in: *IEEE Transactions on Automatic Control, DOI: 10.1109/TAC.2021.3069679.* (2021).

[3] J. Toledo, Y. Wu, H. Ramirez, and Y. Le Gorrec. "Observer-based boundary control of distributed port-Hamiltonian systems." In: *Automatica* 120 (2020).

[4] Y. Wu, B. Hamroun, Y. Le Gorrec, and B. Maschke. "Reduced Order LQG Control Design for Infinite Dimensional Port Hamiltonian Systems." In: *IEEE Transactions on Automatic Control, doi: 10.1109/TAC.2020.2997373* (2020).

[5] V. Trenchant, H. Ramirez, Y. L. Gorrec, and P. Kotyczka. "Finite differences on staggered grids preserving the port-Hamiltonian structure with application to an acoustic duct". In: *Journal of Computational Physics* 373 (2018), pp. 673–697.

[6] Y. Wu, B. Hamroun, Y. Le Gorrec, and B. Maschke. "Reduced order LQG control design for port Hamiltonian systems". In: *Automatica* 95 (2018), pp. 86–92.

[7] A. Macchelli, Y. Le Gorrec, H. Ramirez, and H. Zwart. "On the synthesis of boundary control laws for distributed port Hamiltonian systems." In: *IEEE Transactions on Automatic Control* 62.4 (2017), pp. 1700–1713.

[8] H. Ramirez, H. Zwart, and Y. Le Gorrec. "Stabilization of infinite dimensional port-Hamiltonian systems by nonlinear dynamic boundary control". In: *Automatica* 85 (2017), pp. 61–68.

[9] H. Ramirez, B. Maschke, F. Couenne, and Y. Le Gorrec. "On the passivity based control of irreversible processes: a port-Hamiltonian approach". In: *Automatica* 64 (2016), pp. 105–111.

[10] H. Zwart, Y. Le Gorrec, and B. Maschke. "Building systems from simple hyperbolic ones". In: *System and Control Letters* 91 (2016), pp. 1–6.

[11] N. Lafitte et al. "Improvement of silicon nanotweezers sensitivity for mechanical characterization of biomolecules using closed-loop control". In: *IEEE/ASME Trans. on Mechatronics* (2014), pp. 1–10.

[12] H. Ramirez, Y. Le Gorrec, A. Macchelli, and H. Zwart. "Exponential stabilization of boundary controlled port-Hamiltonian systems with dynamic feedback". In: *IEEE Transactions on Automatic Control* 59.10 (2014), pp. 2849–2855.

[13] Y. Le Gorrec and D. Matignon. "Coupling between hyperbolic and diffusive systems: A port-Hamiltonian formulation". In: *European Journal of Control* 19.6 (2013), pp. 505–512.

[14] J. Villegas, H. Zwart, Y. Le Gorrec, and B. Maschke. "Exponential Stability of a Class of Boundary Control Systems". In: *IEEE Transactions on Automatic Control* 54.1 (2009), pp. 142–147.

[15] Y. Le Gorrec, H. Zwart, and B. Maschke. "Dirac structures and Boundary Control Systems associated with Skew-Symmetric Differential Operators". In: *SIAM Journal on Control and Optimization* 44.5 (2005), pp. 1864–1892.